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Fish systematics

BIOMETRICS CHARACTERISTICS OF SABREFISH
PELECUS CULTRATUS (L.), *SAITHE POLLACHIUS VIRENS* (L.)
AND SEA BASS *DICENTRARCHUS LABRAX* (L.) FROM
NEW LOCALITIES IN POLISH WATERS

CHARAKTERYSTYKA BIOMETRYCZNA CIOSY *PELECUS*
CULTRATUS (L.), CZARNIAKA *POLLACHIUS VIRENS* (L.)
ORAZ LABRAKSA *DICENTRARCHUS LABRAX* (L.) Z NOWYCH
STANOWISK W POLSKICH WODACH

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In the present paper authors demonstrate detailed biomorphometry of one specimen of the sabrefish (Cyprinidae, Cypriniformes) from the lake Dąbie near Szczecin, one specimen of saithe (Gadidae, Gadiformes) caught in the Pomeranian Bay near town Kołobrzeg, and one specimen of sea bass (Moronidae, Perciformes) collected in the Pomeranian Bay, too, near village Trzęsacz.

INTRODUCTION

Sabrefish *Pelecus cultratus* (L.) (Alburninae, Cyprinidae, Cypriniformes), (Boroń 1997) is considered as a rather rare species in Poland. In Poland it occurs mainly in Vistula Lagoon, however not abundantly (Terlecki 1980). It was found also in rivers Vistula and Warta and recent observation indicate for Gdańsk Bay (Stolarski 1995). Heese (1995) when presented catches and distribution of freshwater ichthyofauna in the coastal zone of Baltic Sea (between the mouth of rivers: Parsęta and Wieprza), mentioned also the sabrefish as being caught by fishermen, however extremely rarely (some individuals a year). River Odra is stated as a western boundary of sabrefish distribution, however no confirmed data of its occurrence is given in literature available. According to Terlecki (1996) the opinion on the sabrefish as a very rare and endangered species can result from the lack of full

information on the species distribution and biology in Poland. It is possible, because local fishermen often do not recognise sabrefish, considering it as a big herring.

Saithe *Pollachius virens* (L.) (Gadidae, Gadiformes) is distributed along European coasts from the Bay of Biscay to Greenland, Iceland and Spitzbergen, occasionally occurs in the White Sea; it is met in Skagerrak, Kattegat and rarely in Meklemburg Bay. Saithe inhabits the North Atlantic, as well. Whitehead et al. (1986) do not mention about the occurrence of this species in the Baltic Sea; however Rutkowicz (1982) and Andriašev (1954) state its rare presence in the western Baltic. In Polish waters saithe was found quite often even some years ago (for example in 70-ties and 80-ties); fishermen called it incorrectly a “worse salmon”, due to the colour of its meat. Saithe is considered as a fish of high commercial importance in the world.

Sea bass *Dicentrarchus labrax* (L.) (Moronidae, Perciformes, Eschmeyer 1990) according to Maitland (1977) is distributed along European coasts; inhabits Mediterranean Sea and Black Sea, but does not reach northern coasts of Scandinavia. It is rather common fish in the North Sea. It can appear in Baltic Sea (Rutkowicz 1982), however, no information on its occurrence is available in the Polish literature, either.

Owing to the lack of information on these three species occurred in localities demonstrated in this paper, the present work is aimed at improving the knowledge on distribution and biomorphometry of the fishes discussed.

MATERIAL AND METHODS

One specimen of sabrefish was collected in the lake Dąbie in May/June 1993 (Fig. 1). It was a female with gonads in VI stadium in Maier's scale. One individual of saithe was caught in the Pomeranian Bay, near the town Kołobrzeg (Fig. 1), on 8 December, 1996. Because the fish was gutted on the board of fishing vessel before the examination, determination of sex was not possible. One specimen of sea bass was collected in the Pomeranian Bay (Fig. 1), 2 miles off the shore (the bait: sand-eel), near village Trzęsacz, on 9 September, 1995. Fish was alive, it was a male.

Analysis performed on the fish involved both metric and meristic characters. On the sabrefish 28 metric characters were examined, according to the measurement design given by Brylińska (1986), with slight modification (Fig. 2). Moreover, 6 meristic characters were investigated: number of fin rays (hard and soft) in dorsal, pectoral, ventral and anal fins, as well as number of gill-rakers on the first gill-arch in the first and second row. Count of vertebrae was not examined, owing to the destination of the fish as an exhibit in formalin for a didactic use.

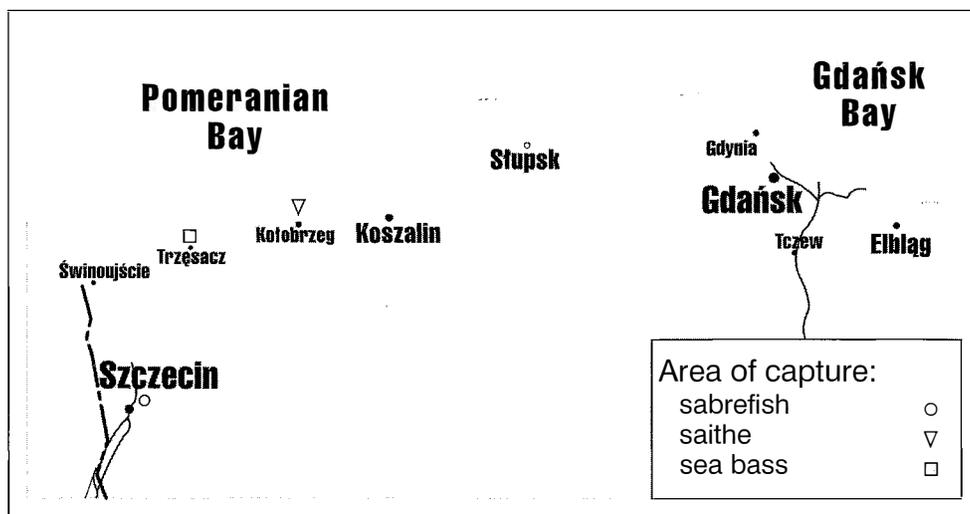


Fig. 1. Area of capture of the fishes studied

Analysis of saithe involved 31 metric and 11 meristic characters. Metric characters were studied according to scheme provided by Więcaszek (1988) (Fig. 3). Analysis of meristic characters comprised the count of rays (exclusively soft) in: three dorsal fins, two anal fins, ventral fin and pectoral one, as well as number of gill-rakers in two rows on the first gill-arch, number of rays in the suboperculum membrane and vertebral count.

On the sea bass 17 measurements were performed and 7 meristic characters were examined. Measurements were made according to the measurement design given by Brylińska (1986) (Fig. 4). The following meristic characters were investigated: number of soft and hard rays in the dorsal, ventral and anal fins, while in the pectoral one only soft rays were found. Moreover, count of gill-rakers in two rows on the first gill-arch and count of suboperculum rays were studied. The scales formula was found, as well: number of scales on the lateral line, number of rows of scales over and beneath the line. No vertebral number was examined due to destination of the fish as an exhibit in our collection for students. Age of the three specimens discussed above was determined from the scales.

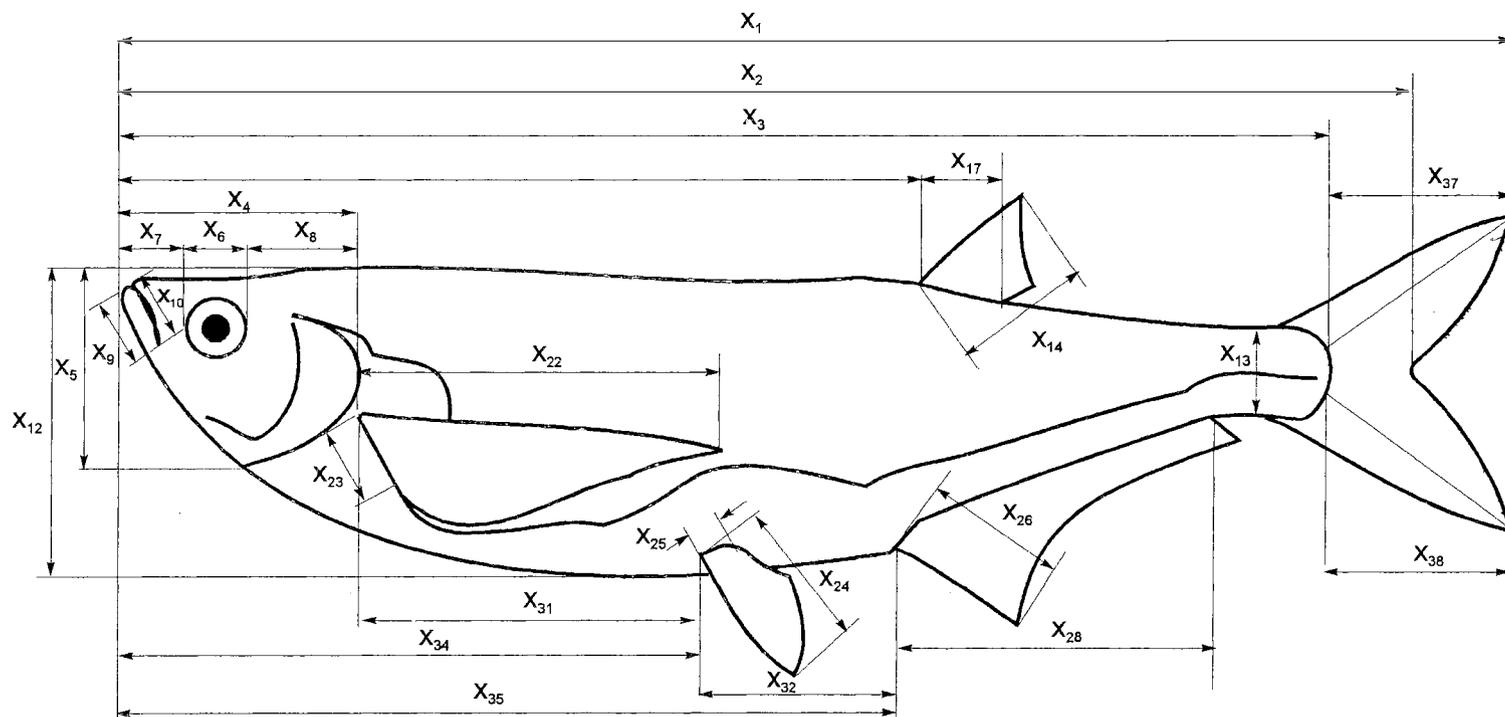


Fig. 2. Measurement design of metric characters of saithe *Pelecus cultratus* (according to Brylińska 1986; markedly modified)

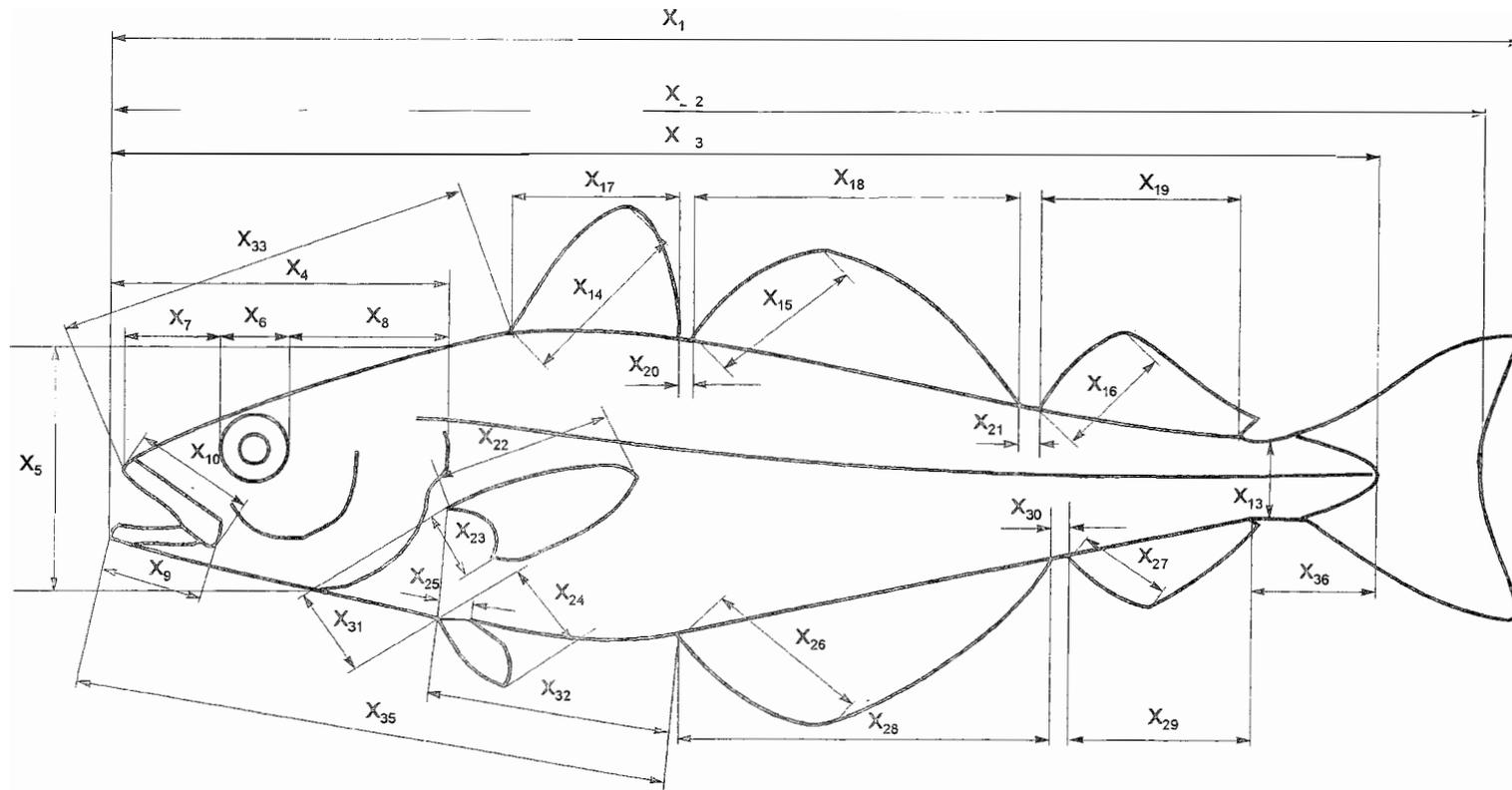


Fig. 3. Measurement design of metric characters of saithe *Pollachius virens* (according to Więcaszek 1988)

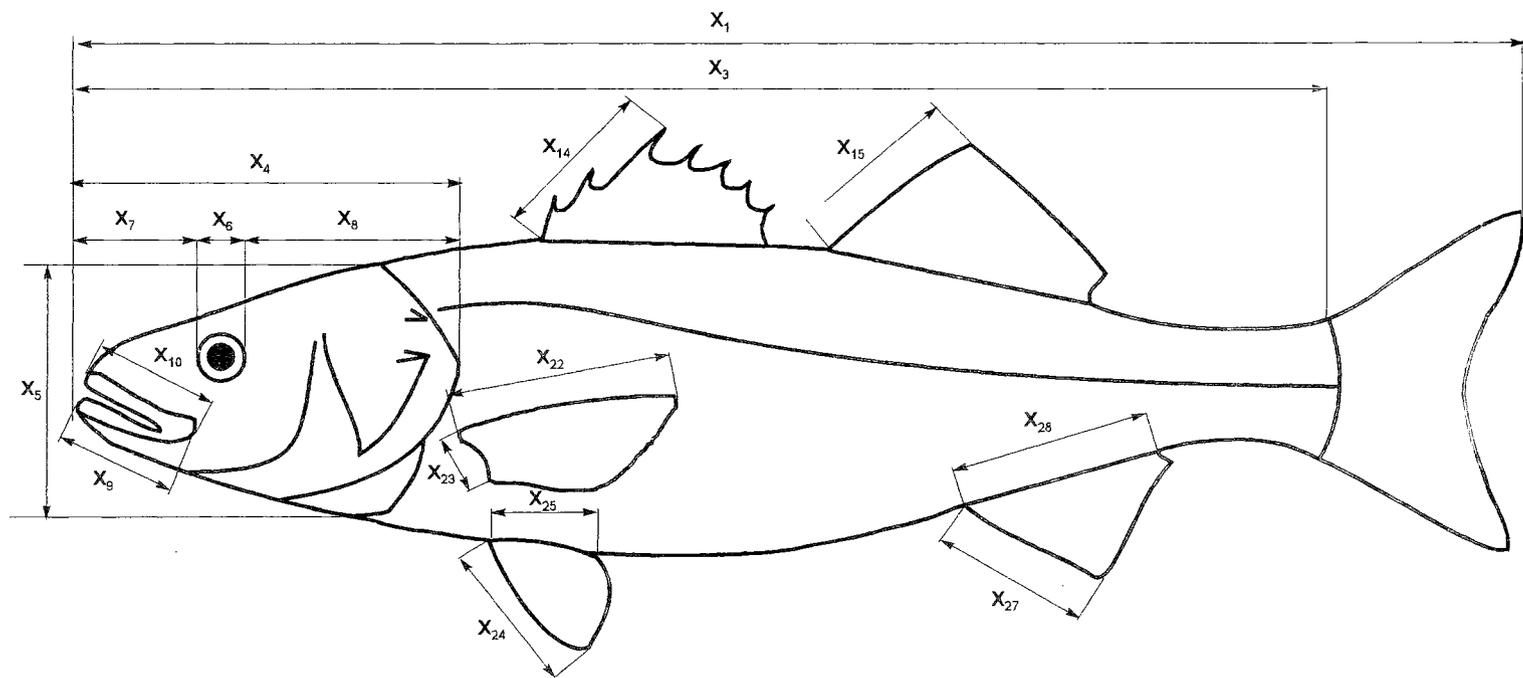


Fig. 4. Measurement design of metric characters of saithe *Dicentrarchus labrax* (according to Brylińska 1986; markedly modified)

RESULTS

Metric characters of the sabrefish investigated is presented in Table 1 (both direct measurements and in relation to the body length), while meristic ones in Table 2. The specimen collected was of total length (l.t.) 35.2 cm and body (or standard) length (l.c.) 30.4 cm. Body weight amounted to 290 g (non-gutted fish). Age of the individual examined (a scale determination) was estimated as 9+. Scale of the sabrefish is cycloid (see Krzykawski and Więcaszek 1997).

Tables 1 and 2 demonstrate also – respectively – metric and meristic characters of the saithe. The specimen captured was of total length (l.t.) 79.8 cm, while body length (l.c.) amounted to 74.5 cm. Fish before the examination was gutted (on the board of fishing vessel); after this process it weighted 3950 g. The sex of specimen therefore was undetermined. The age of fish studied (scale determination) was established as 8+. A scale of the saithe is cycloid, of slightly different shape and size related to the place of arrangement on the fish body (Fig. 5). Gill-apparatus of the saithe is very peculiar. Gill-rakers are situated in two rows on each gill-arch; however, on the first gill-arch first row is built up of long rakers and second one of short ones while on the second and next gill-arches rakers in both rows are short (Figs. 6 and 7).

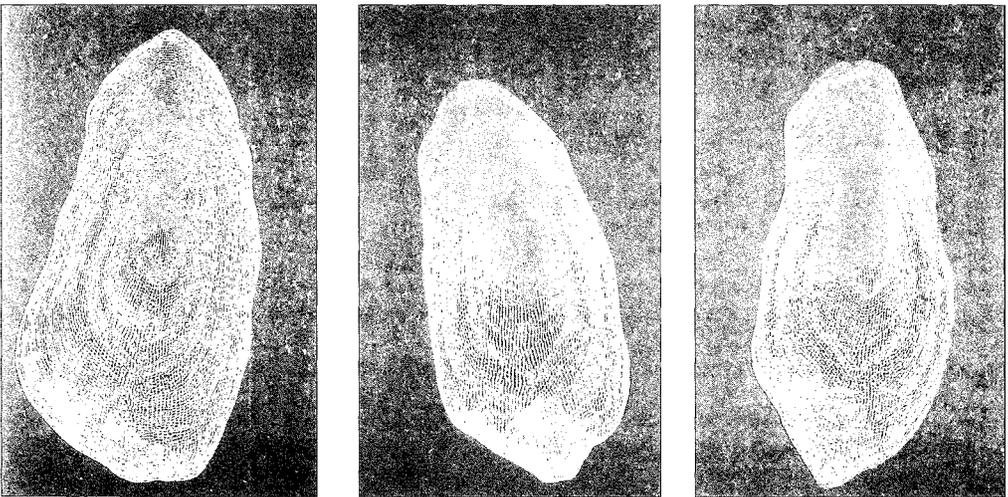


Fig. 5. Shape of saithe's *Pollachius virens* (L.) scales taken from different part of the fish body

Table 1

Metric characters of sabrefish (*Pelecus cultratus*), saithe (*Pollachius virens*) and sea bass (*Dicentrarchus labrax*)

Symbol of character	Character	Value of character (cm)			Relative value (in relation to body length) (%)		
		Sabre-fish	Saithe	Sea bass	Sabre-fish	Saithe	Sea bass
X ₁	<i>Longitudo totalis</i>	35.2	79.8	50.0	115.8	107.1	113.6
X ₂	<i>Longitudo caudalis</i>	32.8	77.8	—	107.9	104.4	—
X ₃	<i>Longitudo corporis</i>	30.4	74.5	44.0	100.0	100.0	100.0
X ₄	<i>Longitudo capitis</i>	6.5	18.5	11.4	21.4	24.8	25.9
X ₅	<i>Altitudo capitis</i>	4.4	11.6	7.5	14.5	15.6	17.0
X ₆	<i>Diameter oculi horizontalis</i>	1.5	2.7	1.9	4.9	3.6	4.3
X ₇	<i>Spatium praeorbitale</i>	1.5	6.2	3.3	5.0	8.3	7.5
X ₈	<i>Spatium postorbitale</i>	3.6	9.8	5.6	11.8	13.2	12.7
X ₉	<i>Longitudo ossis dentale</i>	2.3	9.2	5.4	7.6	12.4	12.3
X ₁₀	<i>Longitudo ossis maxillare</i>	1.8	6.0	4.3	5.9	8.1	9.8
X ₁₁	<i>Latitudo capitis</i>	2.0	—	—	6.6	—	—
X ₁₂	<i>Altitudo corporis maxima</i>	7.3	—	—	24.0	—	—
X ₁₃	<i>Altitudo corporis minima</i>	2.2	3.8	—	7.2	5.1	—
X ₁₄	<i>Altitudo pinnae dorsalis (D₁)</i>	3.7	7.1	4.9	12.2	9.5	13.0
X ₁₅	<i>Altitudo pinnae dorsalis (D₂)</i>	•	6.3	5.2	•	8.5	13.8
X ₁₆	<i>Altitudo pinnae dorsalis (D₃)</i>	•	4.4	•	•	5.9	•
X ₁₇	<i>Longitudo basis pinnae dorsalis (D₁)</i>	1.3	8.0	—	4.3	10.7	—
X ₁₈	<i>Longitudo basis pinnae dorsalis (D₂)</i>	•	17.3	—	•	23.2	—
X ₁₉	<i>Longitudo basis pinnae dorsalis (D₃)</i>	•	9.1	•	•	12.2	•
X ₂₀	<i>Distantia D₁-D₂</i>	•	2.6	—	•	3.5	—
X ₂₁	<i>Distantia D₂-D₃</i>	•	3.6	•	•	4.8	•
X ₂₂	<i>Longitudo pinnae pectoralis (P)</i>	9.1	8.8	5.9	29.9	11.8	13.4
X ₂₃	<i>Longitudo basis pinnae pectoralis (P)</i>	2.0	—	1.5	6.6	—	3.4
X ₂₄	<i>Longitudo pinnae ventralis (V)</i>	4.1	5.3	5.8	13.5	7.1	13.2
X ₂₅	<i>Longitudo basis pinnae ventralis (V)</i>	0.8	—	1.9	2.6	—	4.3
X ₂₆	<i>Altitudo pinnae analis (A₁)</i>	3.9	3.4	6.1	12.8	4.6	13.9
X ₂₇	<i>Altitudo pinnae analis (A₂)</i>	•	4.2	•	•	5.6	•
X ₂₈	<i>Longitudo basis pinnae analis (A₁)</i>	7.5	11.7	5.9	24.7	15.7	13.4
X ₂₉	<i>Longitudo basis pinnae analis (A₂)</i>	•	11.0	•	•	14.8	•
X ₃₀	<i>Distantia A₁ - A₂</i>	•	2.8	•	•	3.8	•
X ₃₁	<i>Distantia P-V</i>	10.1	6.9	—	33.2	9.3	—
X ₃₂	<i>Distantia V-A₁</i>	5.8	21.1	—	19.1	28.3	—
X ₃₃	<i>Longitudo praedorsale</i>	20.5	23.8	—	67.4	32.0	—
X ₃₄	<i>Longitudo praeventrale</i>	15.9	—	—	52.3	—	—
X ₃₅	<i>Longitudo praeanales</i>	21.2	40.5	—	69.7	54.4	—
X ₃₆	<i>Longitudo pedunculi caudae</i>	—	9.7	—	—	13.0	—
X ₃₇	<i>Longitudo pinnae caudalis superior (C)</i>	5.6	—	—	18.4	—	—
X ₃₈	<i>Longitudo pinnae caudalis inferior (C)</i>	6.4	—	—	21.1	—	—

- - lack of character in the species presented.
- - lack of data (character not examined).

Table 2

Meristic characters of sabrefish (*Pelecus cultratus*), saithe (*Pollachius virens*) and sea bass (*Dicentrarchus labrax*)

Character and its symbol	Sabrefish	Saithe	Sea bass
<i>Numerus radiorum pinnae dorsalis</i> (D ₁)	II 7	13	IX
<i>Numerus radiorum pinnae dorsalis</i> (D ₂)	•	20	I 12
<i>Numerus radiorum pinnae dorsalis</i> (D ₃)	•	19	•
<i>Numerus radiorum pinnae pectoralis</i> (P)	I 17	19	16
<i>Numerus radiorum pinnae ventralis</i> (V)	I 7	6	I 6
<i>Numerus radiorum pinnae analis</i> (A ₁)	II 30	24	III 12
<i>Numerus radiorum pinnae analis</i> (A ₂)	•	20	•
<i>Numerus spinarum ad arcum branchii in prima acies</i> (sp.br. ₁)	18	32	24
<i>Numerus spinarum ad arcum branchii in secunda acies</i> (sp.br. ₂)	27	23	20
<i>Numerus radiorum branchialis</i> (r.branch.)	—	7	7
<i>Numerus vertebrae</i> (vt.)	—	55	—

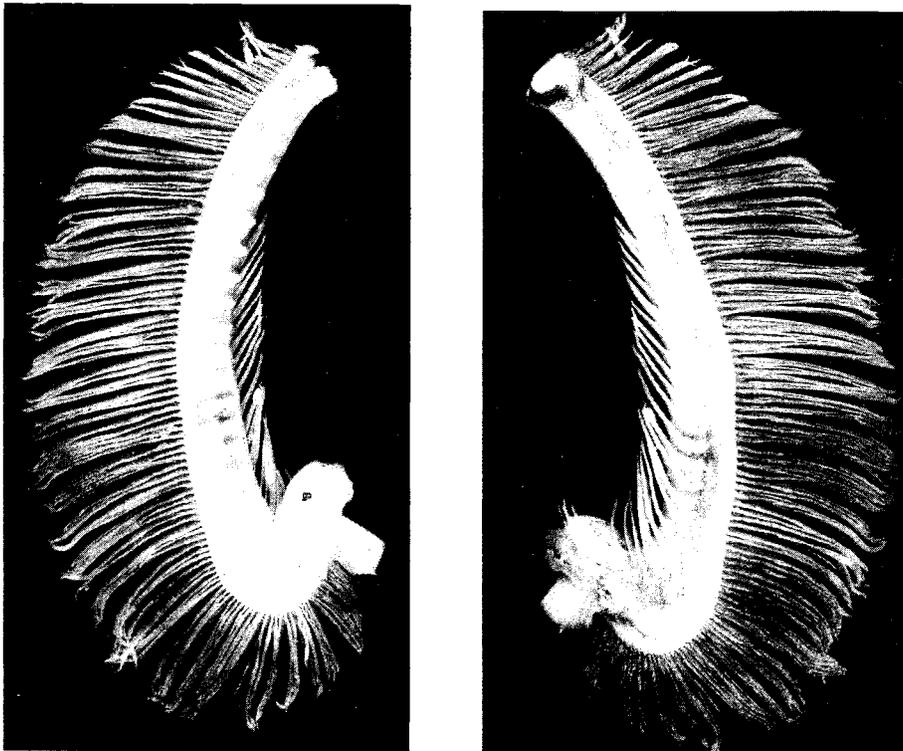


Fig. 6. First gill-arch of saithe *Pollachius virens* (L.) with two rows of gill-rakers (longer rakers in the external row and shorter ones in the internal row)

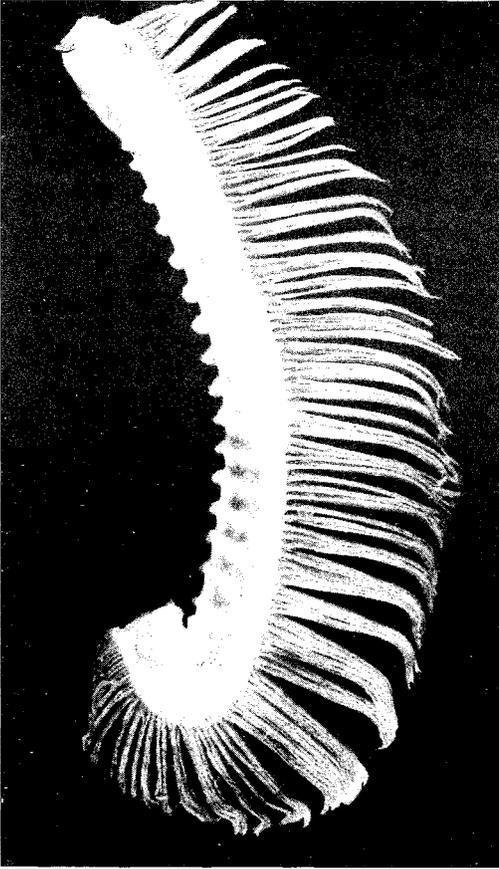


Fig. 7. Second gill-arch of saithe *Pollachius virens* (L.) with two rows of short gill-rakers

Metric and meristic characters of sea bass studied are showed in Tables 1 and 2. Total length (l.t.) of the specimen examined amounted to 50.0 cm, while body length (l.c.)— 44.0 cm. The non-gutted fish weighed 1280 g. It was a male. Age was determined from the scale and estimated as 7+. The sea bass body is covered by two kinds of scales: cycloid (small scales situated exclusively in the interorbital space) and ctenoid ones (see Krzykawski and Więcaszek 1996). Gill-rakers are situated in two rows on the first gill-arch; in the first row (external) they are longer and more numerous, while in the second one (internal) they are short (see Krzykawski and Więcaszek 1996). There was found 68 scales along the lateral line on the fish body and 10 scales on the caudal peduncle. Nine rows of scales was found over the lateral line, while 15 – beneath it.

DISCUSSION

Stolarski (1995) states that the sabrefish has not occurred in the Szczecin Lagoon since twenty years (according to Wesołowska, pers. comm.). However one individual of the species was caught in the lake Dąbie in 1993. Therefore we can claim, that fishes of this species are extremely rare in the north-western Poland, although they might be found in this area.

While compared metric characters (related to the body length) and meristic ones with the data given by Terlecki (1980) and Rolik and Rembiszewski (1987), it can be seen that most of metric characters demonstrate the same range of values; only in 3 characters pertinent to the head: length of head (*longitudo capitis*), depth of head (*altitudo capitis*) and postorbital distance (*spatium postorbitale*) relative values of these features are slightly higher in the individual from the lake Dąbie.

Values of meristic characters in the specimen examined are very close to those given by Terlecki (1980) and Rolik and Rembiszewski (1987). However in the papers available, no count of gill-rakers on the first gill-arch in the second row is recorded; in the sabrefish studied 27 gill-rakers were stated (they are more numerous when compared to the rakers in the first row, however they are fairly shorter). Age of the sabrefish from the lake Dąbie determined as 9+ at a total length of 35.2 cm. Results (direct measurements) obtained by Lugovaja for the Vistula Lagoon (after Stolarski 1995) is similar, while according to the data given by Stolarski (1995) and Terlecki (1987) a fish at 35 cm of length is in age of 6+. The difference may emerge from the different area of capture.

Values of meristic characters of the saithe captured in the Pomeranian Bay are in agree with data given in Andriašev (1954), Maitland (1977) and Whitehead et al. (1986). However no data were found on the meristic characters of fish of this species collected in the Baltic Sea. In the works mentioned no record is given on the very particular design of gill apparatus of saithe (described above in ("Results"). According to Andriašev (1954) length of ventral fins markedly exceeds the eye diameter, ranging from 6.5–7.7% of body length; in own study the value discussed amounted to 7.1% (value of eye diameter – 3.6% when related to the body length). Age of the specimen collected was determined as 8+ (79.8 cm of total length); similarly Cięglewicz and Draganik (1969) for the saithe from the Norwegian Sea indicated for the VIII age group for fish 79.8 and 81.2 cm long (von Bertalanffy equation and back measurements, respectively).

Sea bass is an extremely rarely fish species found in the Baltic Sea. It may result, however, also from the fact that local fishermen could not recognise this species regarded it as a pike-perch. In the period of catch of specimen studied probably one or two more specimens of sea bass were collected, unfortunately they were sold by fishermen (as a pike-perch) (pers. comm.). Values of meristic characters in the individual collected are in agree with data given by Rutkowicz (1982) and Whitehead et al. (1986) for the specific areas of sea bass distribution.

CONCLUSIONS

1. Meristic characters of the specimen of sabrefish captured in the lake Dąbie can be described as follows: D II 7, P I 17, V I 7, A II 30, sp.br.₁ 18, sp.br.₂ 27. The individual studied is characterised by slightly bigger head when compared to the sabrefish from the Vistula Lagoon.
2. Meristic characters of the individual of saithe collected in the Pomeranian Bay near town Kołobrzeg can be described as follows: D₁ 13, D₂ 20, D₃ 19, P 19, V 6, A₁ 24, A₂ 20, sp. br.₁ 32, sp. br.₂ 23, r.branch. 7, vt. 55. The specimen captured occurred in Polish waters probably with strong inflow from the North Sea.

3. Meristic characters of the specimen of sea bass captured in the Pomeranian Bay near village Trzęsacz can be presented as follows: D₁ IX, D₂ I 12, P 16, V I 6, A III 12, sp. br.₁ 24, sp. br.₂ 20, r. branch. 7. Similarly like in the case of saithe, sea bass probably occurred in the Baltic waters with the inflow from the North Sea.

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CHARAKTERYSTYKA BIOMETRYCZNA CIOSY *PELECUS CULTRATUS* (L.),
CZARNIAKA *POLLACHIUS VIRENS* (L.) ORAZ LABRAKSA *DICENTRARCHUS*
LABRAX (L.) Z NOWYCH STANOWISK W POLSKICH WODACH

STRESZCZENIE

Niniejsza praca przedstawia szczegółową charakterystykę biometryczną przedstawicieli trzech gatunków ryb, spotykanych niezwykle rzadko w opisanych stanowiskach w wodach Polski. Ciosa *Pelecus cultratus* (L.) została złowiona na przełomie maja i czerwca 1993 roku w jeziorze Dąbie, czarniak *Pollachius virens* (L.) 8 grudnia 1996 roku w Zatoce Pomorskiej (na wysokości miasta Kołobrzeg), natomiast labraks *Dicentrarchus labrax* (L.) również w Zatoce Pomorskiej, na wysokości miejscowości Trzęsacz (9 września 1995 roku). Ponadto, oprócz wyników analizy biometrycznej, określono również wiek opisanych osobników, na podstawie liczby pierścieni rocznych na łuskach.

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